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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09 784,910	02/16/2001	Stevan Dimitrijevic	14310	4431

7890 02/27/2003

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EXAMINER

SANTIAGO, MARICELI

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 02/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/784,910

Applicant(s)

DIMITRIJEVIC ET AL.

Examiner

Mariceli Santiago

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 09 December 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 1-8, 40 and 41 is/are allowed.
- 6) ☐ Claim(s) 9-39 and 42-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 16 February 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3,5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's arguments regarding the restriction requirements have been found persuasive, accordingly, the restriction requirement made in Paper No. 8 is hereby withdrawn.

Specification

A substitute specification including the claims is required pursuant to 37 CFR 1.125(a) because the top margin of the specification is less than 2.0 cm (3/4 inch), the top margin comprises through-holes which prevents legibility of the application papers and renders it difficult to arrange the papers for printing or copying.

A substitute specification filed under 37 CFR 1.125(a) must only contain subject matter from the original specification and any previously entered amendment under 37 CFR 1.121. If the substitute specification contains additional subject matter not of record, the substitute specification must be filed under 37 CFR 1.125(b) and must be accompanied by: 1) a statement that the substitute specification contains no new matter; and 2) a marked-up copy showing the amendments to be made via the substitute specification relative to the specification at the time the substitute specification is filed.

Claim Objections

Claim 47 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 47 recites the same limitations of claim 46; furthermore, the nanotubes are located (i.e., affixed thereto) on an electron field emitter substrate as recited in claim 46.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9-39 and 42-48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "an amount to sufficient" in claim 9 is a relative term which renders the claim indefinite. The term "an amount to sufficient" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The term fails to assert the amount of diamond or diamond-like carbon sufficient to retard the evaporation of carbon from the nanotubes in order to reasonably understand the scope of the invention.

The term "effective amount" in claims 20 and 30 is a relative term which renders the claims indefinite. The term "effective amount" is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The term fails to assert the effective amount of diamond or diamond-like carbon to substantially coat the nanotubes.

The term "an amount effective" in claims 46 and 47 is a relative term which renders the claims indefinite. The term "an amount effective" is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The term fails to assert the amount of diamond or diamond-like carbon effective to retard evaporation of carbon from the coated nanotubes in order to reasonably understand the scope of the invention.

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Claim 49 recites the limitation "by depositing the nanotube on the substrate, in situ", however, it further recites the limitation "the nanotube is formed by condensation of vaporized carbon in a nanotube forming atmosphere prior to its deposition on the substrate", the limitations render the claim indefinite since they contradict each other. Particularly, if the nanotube is grown in situ on the substrate, it is not clear how the nanotube is consequently formed prior to its deposition on the substrate.

Claims 10-18, 42 and 43 are rejected for the reasons given in claim 9 because of their dependency status from claim 9.

Claims 21-29 and 39 are rejected for the reasons given in claim 20 because of their dependency status from claim 20.

Claims 31-38, 44 and 45 are rejected for the reasons given in claim 30 because of their dependency status from claim 30.

Claim 48 is rejected for the reasons given in claim 46 because of its dependency status from claim 46.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 49 is rejected under 35 U.S.C. 102(b) as being anticipated by Kusunoki et al. (EP 0 947 466 A1).

Regarding claim 49, Kusunoki discloses a method of forming a field emission cathode structure comprising a substrate having a nanotube field emission cathode affixed thereon

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(Column 9, Paragraph [0043]), wherein the nanotube is affixed to the substrate by depositing the nanotube on the substrate, in situ (Column 2, Paragraphs [0009]-[0013]). Furthermore, Kusunoki discloses a process of forming nanotubes in a carbon vaporizing process wherein the nanotubes are formed by condensation of vaporized carbon in a nanotube forming atmosphere prior to deposition on the substrate (Column 1, Paragraphs [0002]-[0004]).

Allowable Subject Matter

Claims 1-8, 40 and 41 are allowed.

Claims 9-39 and 42-48 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 1, the references of the Prior Art of record fails to teach or suggest the combination of the limitations as set forth in claim 1, and specifically comprising the limitation of a nanotube having a substantially uniform coating of diamond or diamond-like carbon, the coating of the nanotube having a thickness ranging from about 10 nm to about 100 nm.

Regarding claims 2-8, 40 and 41, claims 2-8, 40 and 41 are allowable for the reasons given in claim 1 because of their dependency status from claim 1.

Regarding claim 9, the references of the Prior Art of record fails to teach or suggest the combination of the limitations as set forth in claim 9, and specifically comprising the limitation of nanotubes coating the substrate and a substantially uniform coating of diamond or diamond-like carbon on the nanotubes.

Regarding claims 10-19, 42 and 43, claims 10-19, 42 and 43 are allowable for the reasons given in claim 9 because of their dependency status from claim 9.

Regarding claim 20, the references of the Prior Art of record fails to teach or suggest the combination of the limitations as set forth in claim 20, and specifically comprising the limitation of a cathode comprised of nanotubes coating a substrate, the method comprising substantially uniform coating the nanotubes with an enhancing electron field emission effective amount of either diamond or diamond-like carbon.

Regarding claims 21-29 and 39, claims 21-29 and 39 are allowable for the reasons given in claim 20 because of their dependency status from claim 20.

Regarding claim 30, the references of the Prior Art of record fails to teach or suggest the combination of the limitations as set forth in claim 30, and specifically comprising the limitation of a cathode comprised of nanotubes coating a substrate, the method comprising coating the nanotubes with a carbon evaporating inhibiting effective amount of either diamond or diamond-like carbon.

Regarding claims 31-38, 44 and 45, claims 31-38, 44 and 45 are allowable for the reasons given in claim 30 because of their dependency status from claim 30.

Regarding claim 46, the references of the Prior Art of record fails to teach or suggest the combination of the limitations as set forth in claim 46, and specifically comprising the limitation of a substrate having a nanotube field emission cathode affixed thereto that comprises coating the field emission surface of the nanotube cathode with a diamond or diamond-like carbon.

Regarding claims 47 and 48, claims 47 and 48 are allowable for the reasons given in claim 46 because of their dependency status from claim 46.

Other Prior Art Cited

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Choi et al., in US 6,504,292, discloses a field-emitting device comprising metallized nanostructures and method of making the same.

Brown et al., in US 6,383,923, discloses an article comprising vertically nano-structures devices with a conductive film coating the nano-structures.

Goren et al., in US 6,297,592, discloses a microwave vacuum tube device employing a nanotube emitting source and method of manufacturing the nanotube emitting source.

Jin, in US 6,286,226, discloses a tactile sensor comprising coated nanowires and method of making the same.

Smalley et al., in US 6,183,714, discloses a method of making ropes of single-wall carbon nanotubes.

Givargizov et al., in US 5,825,122, discloses a field emission cathode and a device based thereon.

Smalley, in US 5,591,312, discloses a process for making fullerene fibers.

Jones, in US 5,583,393, discloses a selectively shaped field emission electron beam source including diamond-coated emitters.

Kane et al., in US 5,129,850, discloses a method of making a molded field emission electron emitter employing a diamond coating.

Contact Information

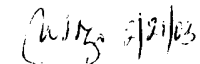
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mariceli Santiago whose telephone number is (703) 305-1083. The examiner can normally be reached on Monday-Friday from 7:00 AM to 3:30 PM.

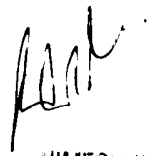
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel, can be reached on (703) 305-4794. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7382. Additionally,

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the following fax phone numbers can be used during the prosecution of this application (703) 872-9318 (for response before a Final Action) and (703) 872-9319 (for response after a Final Action).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


Mariceli Santiago
Patent Examiner
Art Unit 2879


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